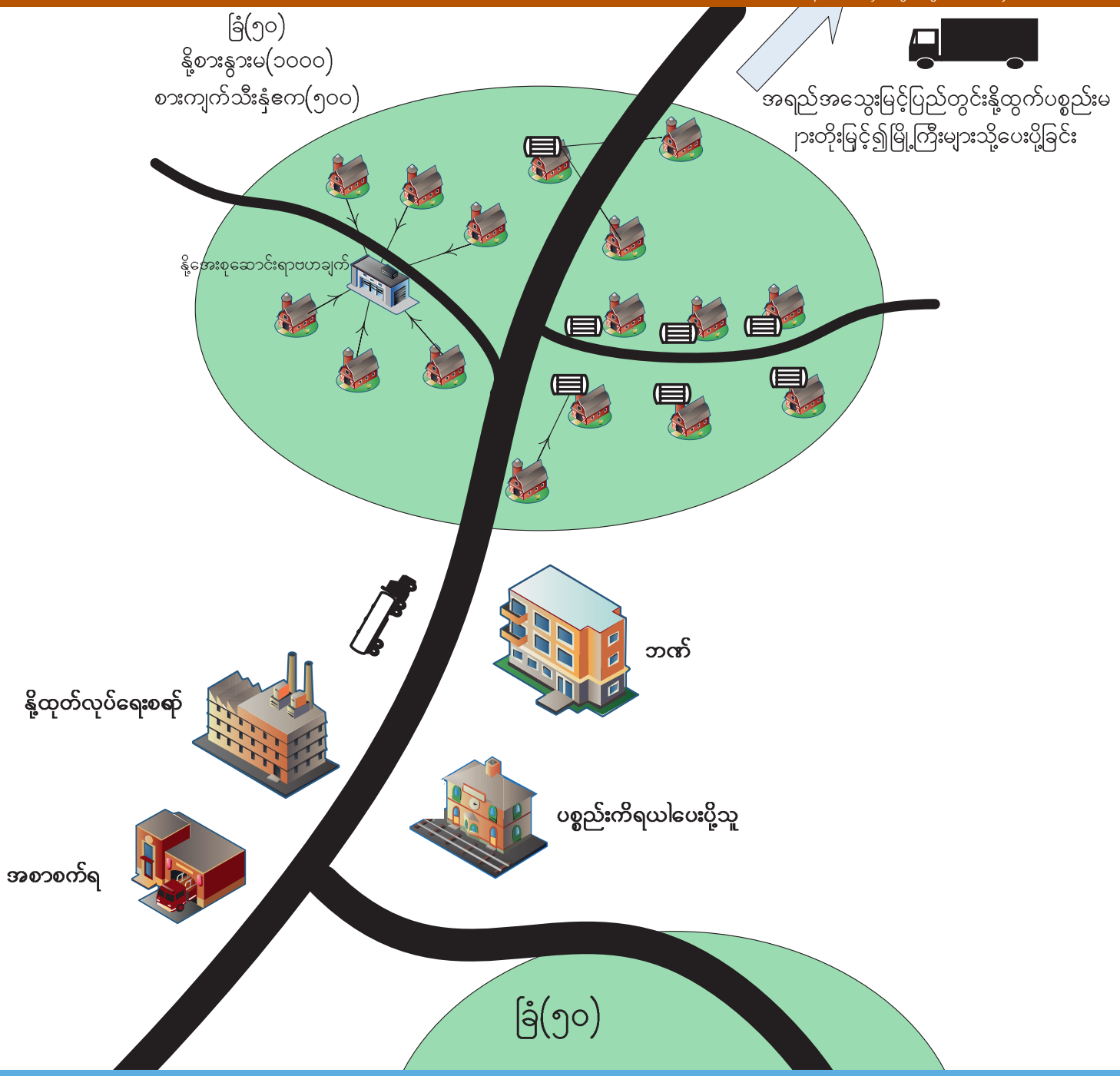

Dairy cluster design for Myanmar

Jelle Zijlstra and Jan van der Lee

LIVESTOCK RESEARCH
WAGENINGEN UR

Dairy cluster design for Myanmar

Jelle Zijlstra and Jan van der Lee

Wageningen UR Livestock Research

This research was conducted by Wageningen UR Livestock Research, commissioned and funded by the Ministry of Economic Affairs under the project "Strategy Dairy Sector Development Myanmar" (order number: 1300019114)

Wageningen UR Livestock Research
Wageningen, May 2015

Livestock Research Report 866

LIVESTOCK RESEARCH
WAGENINGEN UR

Zijlstra, J., and J. van der Lee, 2015. *Dairy cluster design for Myanmar.* Wageningen, Wageningen UR (University & Research centre) Livestock Research, Livestock Research Report 866.

Summary
At the request of the Dutch and Myanmar governments, a project team consisting of researchers from Wageningen University & Research centre and experts from dairy processor Royal FrieslandCampina, feed company Royal De Heus and AgriWorks consultancy have developed a design for a dairy cluster in Myanmar. The plan is for the cluster to start with 50 farms that deliver 8,000 kilograms of milk per day. The availability of fodder, the quality of raw milk, and cooperation with local government and dairy experts are considered to be key elements for the success of the cluster. These key elements have to be elaborated further before proceeding to the next steps towards implementation.

Livestock Research Report 866

Contents

Key abbreviations and currency rates

AI	Artificial insemination
DSF	Dairy Sustainability Framework
EZ	Ministry of Economic Affairs (the Netherlands)
LBVD	Livestock Breeding & Veterinary Department, part of MLFRD
MDA	Myanmar Dairy Association
MLF	Myanmar Livestock Federation
MLFRD	Ministry of Livestock, Fisheries and Rural Development (Myanmar)
Wageningen UR	Wageningen University & Research centre

Currency rates (May 1st, 2015)

€ 1	= MMK 1219 MMK (Burmese Kyatt)
MMK 1,000	= € 0.820

Foreword

This report explores the merits of the cluster approach for dairy sector development in Myanmar. It is one in a series of sector assessments commissioned by the Netherlands Economic Mission in Yangon in an effort to lay the foundation for a Myanmar–Netherlands cooperation programme in the field of agriculture, livestock and fisheries and to identify investment opportunities in the agrifood sector of Myanmar.

Dairy development is part of the Memorandum of Understanding between the governments of Myanmar and the Netherlands on cooperation in the field of agriculture. With the expected increase in consumption of dairy products, the contribution of dairy to nutrition and the present level of around 50 per cent self-sufficiency, development of the dairy sector is very relevant. The sector can also contribute to much-needed extra employment and income in rural areas.

This report builds on an earlier report, "The Myanmar dairy sector, a quick scan of opportunities", which recommended, among other things, exploring the potential of a cluster approach. In close consultation with the Myanmar Ministry of Livestock, Fisheries and Rural Development (MLFRD), further exploration of the cluster approach was prioritised as the next step.

I would like to thank MLFRD for its cooperation, Royal FrieslandCampina and Royal De Heus for their full participation in the project from the start and Wageningen University & Research centre for leading the project.

A special word of thanks goes also to the project team members who made it possible to present the final results in this report: Sybren Attema and Annelinde Barbiers (Royal FrieslandCampina), Johan van de Ban, Theo Tuyen and Johannes Drees (Royal De Heus), Martin de Jong (AgriWorks), Bram Wouters, Jan van der Lee and Jelle Zijlstra (Wageningen UR Livestock Research).

I hope and trust that the report will be a strong and useful tool in the further policy discussion within Myanmar about dairy development and in exploring possibilities for Myanmar–Netherlands cooperation in the dairy sector.

Geert Westenbrink,
Agricultural Counsellor
Netherlands Economic Mission, Yangon

Summary

Domestic milk production in Myanmar is estimated to be less than 50 per cent of consumption. As the Myanmar Government is pursuing an increase in domestic production, it has asked the Dutch Ministry of Economic Affairs (EZ) for support in exploring the opportunities in dairy sector development. A first step was a quick scan to identify opportunities for developing the Myanmar dairy sector, which was carried out in 2014. One of the recommendations of this quick scan was to consider the development of dairy clusters. EZ therefore asked Wageningen University & Research centre (Wageningen UR) to develop a private sector–driven initiative to combine trade for the Dutch private sector with offering aid to sector development in Myanmar. Two Dutch companies present in Myanmar, dairy processor Royal FrieslandCampina and feed company Royal De Heus, joined forces with Wageningen UR and drafted a design for a dairy cluster. This design and the recommendations described in this report are intended for the governments of Myanmar and the Netherlands, the boards of the two private companies involved, and additional parties that are or will be involved in dairy chain development in Myanmar. The dairy cluster design is one of the efforts to support the Myanmar Government in building a dairy strategy.

Why a cluster approach?

The cluster design aims:

1. To contribute to building a strong dairy chain
2. To realize economies of scale on dairy farms as well as in the dairy processing industry and in business and logistics connected to dairy farms
3. To accelerate capacity building and innovation through concentration of knowledge and information.

The idea behind the dairy cluster is that clustering of dairy farms, processing, commercial support services (quality testing for milk and feed, finance, veterinary services and input supplies), education and extension within a restricted area will create a more efficient regional dairy chain.

The cluster picture

Figure S1 shows the key elements of the designed dairy cluster. The cluster is planned to start producing and processing 8,000 kilograms of milk per day collected from 50 farms with an average herd size of 20 cows. Within five years from the start, the cluster will slowly double in size, to produce 16,000 kilograms of milk per day. This goal will be reached by improving technical results, expanding herd size and by adding additional farms to the cluster. The growth of the cluster and the improved productivity and efficiency of the farms together with improved skills of the farmers will be achieved by the close cooperation of farmers with suppliers, processors, banks and the government. The improved technical and economic results of farmers and other parties within the cluster will also be the consequence of continuous education, applied research and advisory activities carried out by staff operating within the cluster.

Advisory services are an important component for developing dairy farms within the cluster. In the first years after the start of the cluster, the feed company and the dairy processor will deliver advisory services, but these activities will be progressively handed over to private or farmer-owned advisory firms. The Myanmar Government and NGOs will also be invited to support the cluster with (partly) subsidized advisory services.

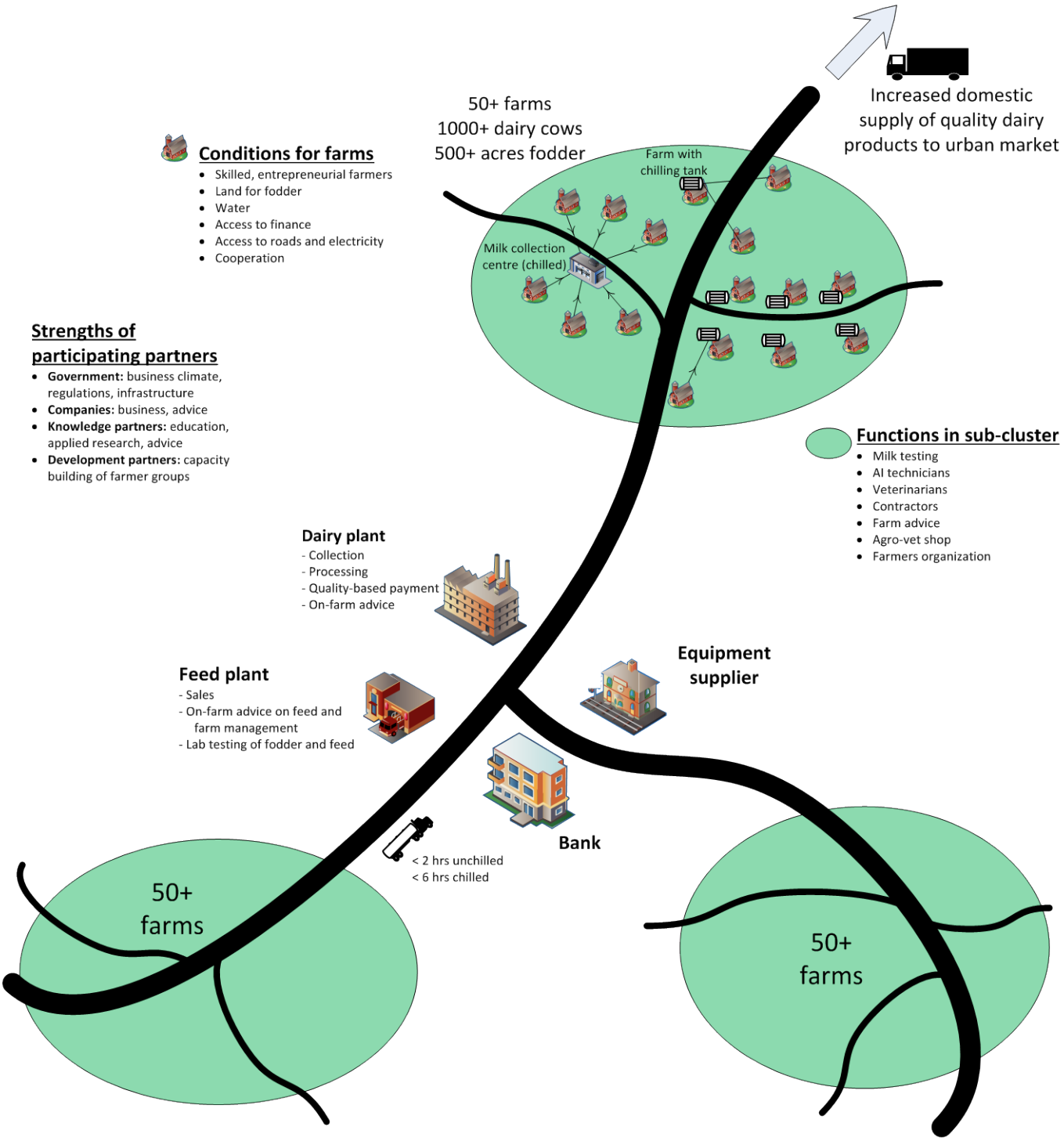

Figure S1. *Schematic representation of the designed dairy cluster*

Key elements for the cluster

The designers proposed that three key elements will be required to build a competitive dairy cluster for the Myanmar situation. Each element needs due attention when preparing and building the cluster:

1. The availability of sufficient fodder to achieve increased production per cow and to feed more cows when farms expand. Both will lead to an increase in domestic milk production. Higher needs for fodder require more land for fodder production and/or more by-products that combine a high energy content of fodder with enough fibre.
2. High quality of raw milk. The processor needs high quality milk to meet the demand for high quality dairy products in the future Myanmar market.
3. Cooperation with local government and dairy experts. A better insight to the driving factors and constraints that may help or hinder farmers to start with dairy or to expand the dairy branch on the farm is needed to make a well-founded plan for a dairy cluster with expansion ambitions.

Next steps towards implementation

It should be clear that before the cluster design can be implemented, more detailed investigations and consultations are needed. The private companies participating in the project indicated a need for more in-depth knowledge of the Myanmar dairy situation and the outlook for the dairy sector in the country, which they can achieve through closer collaboration with the Myanmar Government and Myanmar dairy experts. Specifically, they need a better understanding of the Myanmar Government policy on dairy and the motivation of dairy farmers to start and/or expand the dairy farm. The three key elements mentioned above as well as cooperation with local partners or NGOs to establish advisory services are topics that have to be elaborated further.

The final implementation of the dairy cluster requires further steps. The parties involved have to be brought together to agree about further development, commitment and responsibilities. The next step will be to choose a region where the cluster will be established. A feasibility study will be the last step before the final decision of the partners to begin implementing the cluster.

1 Introduction

1.1 Motivation

Since domestic milk production in Myanmar is estimated to be less than 50 per cent of consumption, the Myanmar Ministry of Livestock, Fisheries and Rural Development (MLFRD) is aiming to develop the national dairy sector (Global Times 2013). MLFRD and the Dutch Ministry of Economic Affairs (EZ) therefore agreed to collaborate on working towards a dairy strategy for Myanmar.

"Combining aid and trade" and collaboration between the Dutch government and Dutch private companies within top sectors are cornerstones in Dutch trade and aid policies. This means that Dutch support to dairy development in Myanmar will be focused on private sector–driven initiatives. Hence the Dutch government has asked the private companies Royal FrieslandCampina and Royal De Heus (both already active in Myanmar) to collaborate with Wageningen University & Research centre (Wageningen UR) and Myanmar stakeholders to develop a cluster approach for possible implementation in the dairy sector in Myanmar. This collaboration resulted in the project "Dairy Cluster Myanmar"[1]. The results of this explanatory research project are described in this report.[2] The idea to explore how a cluster approach can contribute to the Myanmar dairy strategy was one of the recommendations of a quick scan by a Dutch-Myanmar group of experts who assessed opportunities to develop the Myanmar dairy sector in 2014 (Van der Lee et al., 2014).

The idea is that clustering of dairy farms, processing, commercial support services (quality testing for milk and feed, finance, veterinary services and input supplies), education and extension within a restricted area will create a more efficient regional dairy chain. It will also lead to higher quality products which in turn offer better marketing possibilities. Development of rural infrastructure (electrification, roads and communication) can be an integral part in developing such a dairy cluster. If successful, this regional approach can later be implemented in more regions, working towards an efficient national dairy chain for Myanmar.

The project was mainly funded by EZ. The private sector companies Royal FrieslandCampina and Royal De Heus financed their own contributions to the project. The participation of the Myanmar Government agencies and Dutch companies should create opportunities for a speedy and reliable implementation of the plan after the initial phase described in this report is finished. This was also the intention of the agreement between MLFRD and EZ.

1.2 Added value of clustering

The dairy cluster approach described in this paper aims to establish a group of specialized dairy farms producing sufficient volume of high quality milk for the lowest cost in a designated geographical area, in close collaboration with a processor, a feed company, other suppliers and knowledge institutes. The main added value of clusters to competitiveness, as identified by Porter (1998, cited by Splinter et al., 2011), has to do with increased productivity, speeding up innovation and stimulating new businesses. Within the cluster, competition and cooperation are both stimulated; this may occur at the same time, because competition and cooperation occur on different dimensions and among different players. Since the cluster offers a great number of entrepreneurs, it is easy to find partners in business. The many competitors challenge and stimulate each other to innovate continuously. A more extensive

[1] The project name "Dairy Cluster Myanmar" is used as a working title instead of the title "Strategy Dairy Sector Development Myanmar", which is used in the official EZ documents.

[2] This report is by the project team consisting of staff members of Wageningen UR , Royal FrieslandCampina, Royal De Heus and a consultant of AgriWorks. Opinions and findings are the results of group investigations and discussions. First person mentions of "we" refer to this project team.

explanation of cluster theory can be found in Porter (1998); a summary is given by Splinter et al. (2011).
The large number of players within a dairy cluster offers opportunities for suppliers of equipment and inputs needed by dairy farmers. The same is true for providers of other related services, such as trainers, advisors, buyers and sellers of livestock and feed, veterinarians and artificial insemination (AI) technicians. If the cluster is large enough, it also offers opportunities for dairy education and research institutions that need large numbers of dairy farmers in order to be profitable.
In many regions in the world we have seen that successful dairy clusters emerged in areas with many dairy farms and milk processing plants. These concentrations of dairy farms, processing and input services have been a fertile breeding ground for innovation and sector success. In fact, the economies of scale and the strong focus of many skilled dairy sector workers in one business sector have created a competitive regional sector. Successful dairy regions in Northwestern Europe, Italy (Po Valley), the United States (Wisconsin, California), Canada (Ontario), Australia and New Zealand illustrate this advantage of clustering. Usually one or more dairy processors in the cluster are important carriers of the strengths of the cluster as a whole.
Collaboration within dairy clusters (sometimes described as "dairy zones") has also been practised recently in many countries in Asia, such as China, the Philippines, Indonesia, Vietnam and Pakistan (Morgan and Dugdill, 2009). In the Philippines and China, dairy producers were regrouped in a designated area, with processors or a local government constructing the infrastructure. These zones gave a number of advantages:
… technical assistance and supervision that is provided, while the separation between production and residential areas benefits disease control. In the Philippines many of the zones are public-private partnerships with the National Dairy Authority, which provides development support, while in China financial assistance is available through government supportive policies. (Morgan and Dugdill, 2009).

1.3 Aims of the project

The motivation to design a cluster approach can be summarized in three aims:
1. To contribute to building a strong dairy chain; the cluster approach will be a small-scale pilot for the desired transformation of the Myanmar dairy chain.
2. To realize economies of scale on dairy farms as well as in the dairy processing industry and in business and logistics connected to dairy farms
3. To accelerate capacity building and innovation through concentration of knowledge and information.

1.4 The project team and its mission

This report is the result of investigations and discussions by a project team consisting of staff members from the parties involved (see section 2.2), including an independent dairy consultant:
- Sybren Attema and Annelinde Barbiers (Royal FrieslandCampina)
- Johan van de Ban, Theo Tuyen and Johannes Drees (Royal De Heus)
- Martin de Jong (AgriWorks)
- Bram Wouters, Jan van der Lee and Jelle Zijlstra (Wageningen UR Livestock Research).

This proposal and the recommendations described in this report are intended for the governments of Myanmar and the Netherlands, the boards of the two private companies involved, and additional parties that are or will be involved in dairy chain development in Myanmar.

Acknowledgment

The project team received valuable information and recommendations through discussions with His Excellency deputy minister of Livestock Fisheries and Rural Development dr. Aung Myat Oo and senior staff of MLFRD and also through discussions with staff of Livestock Breeding & Veterinary Department (LBVD) of MLFRD in both Yangon area and South Shan State. We are very grateful to them for their support at the time of preparation of the field visits, during the meetings and during the farm visits.

Disclaimer

The opinions and views presented in this report are based on the knowledge of facts and estimates of future perspectives for dairy in Myanmar made by the members of the project team. They are developed within the project team meetings and do not necessarily reflect the views and perspectives of the team members' employers.

2 Public policies and business ambitions of private partners in the project

2.1 The Myanmar Government dairy policy

Two basic goals the MLFRD hopes to achieve by developing the dairy sector are improving rural development and developing the livestock sector. More specifically, the goals are to increase domestic milk production and add to national wealth (higher gross domestic product).

Improving the livelihoods of the rural population is the main vision of the underlying Rural Development Strategy of MLFRD. This strategy focuses first on inclusive and sustainable rural development that contributes to reducing poverty and improving nutrition in Myanmar, with a high priority on creating more employment and income. The second focus is on community-based organizations that will create resilient local communities.

Myanmar has adopted a market-oriented economic policy and therefore welcomes foreign direct investments in the livestock sector. The government is interested in cooperating with foreign investors to develop animal production, milk and milk processing, breed upgrading, distribution and sales of animals and semen, a school milk program and animal disease prevention and treatment in Myanmar (MLFRD, 2014).

2.2 Ambitions of Dutch parties involved

The Dutch Government has opened an Economic Mission in Myanmar and the Netherlands intends to contribute to inclusive, broad based economic development of Myanmar. It sees good opportunities for public-private cooperation in a number of sectors the Netherlands has a strong competitive position in. In this way it will contribute to develope the huge potential of agricultural sectors in Myanmar (Asian Development Bank, 2014).

The Dutch dairy company Royal FrieslandCampina is considering entering into the Myanmar dairy sector. In that case the company is willing to contribute to domestic milk production in Myanmar by introducing a dairy development program. Royal FrieslandCampina has extensive experience in South-East Asia working with governments on dairy strategies that stimulate higher quality standards.

The Dutch feed company Royal De Heus is aware of the opportunities for production and sales of animal feed products for livestock in Myanmar, so is investing in a feed factory that will start up in 2016. The factory will start producing feed for poultry and pigs, and Royal De Heus is also positive about the outlook for dairy cattle feed production. The company is eager to be at the forefront in developing the dairy sector in Myanmar.

Wageningen UR collaborates with EZ to explore the potential of the dairy sector in Myanmar. The quick scan in 2014 of opportunities (Van der Lee et al., 2014) was the primary reason EZ asked Wageningen UR to explore possibilities for business collaboration between Dutch companies involved in dairy and dairy farmers and suppliers in Myanmar.
It is the intention of EZ to also involve other Dutch parties to collaborate on future developments and implementation of the cluster approach.

3 Process followed

3.1 Work plan

This report is the result of close cooperation within a project team of representatives from a Dutch dairy processor, a Dutch feed plant and an independent dairy consultant as well as dairy researchers from a Dutch agricultural university. All of them have provided ideas based on their best available knowledge about the dairy situation in Myanmar, augmented wiFth experiences in other countries. During a field visit to Myanmar in March 2015, they discussed the draft concept of a dairy cluster with representatives of the Myanmar Livestock Federation (MLF), the Myanmar dairy Association (MDA), the MLFRD and LBVD in two different regions (Yangon and South Shan State). During this field visit and during a previous field visit in 2014, they visited farms to get an idea of current dairy farming practice in several regions of Myanmar.

Figure 1 shows the consecutive activities carried out that resulted in the final design of the dairy cluster. The process began with the formation of a project team including the Dutch companies that would participate in the cluster design process, and it ended with the final design and documentation of the characteristics of this design as described here.

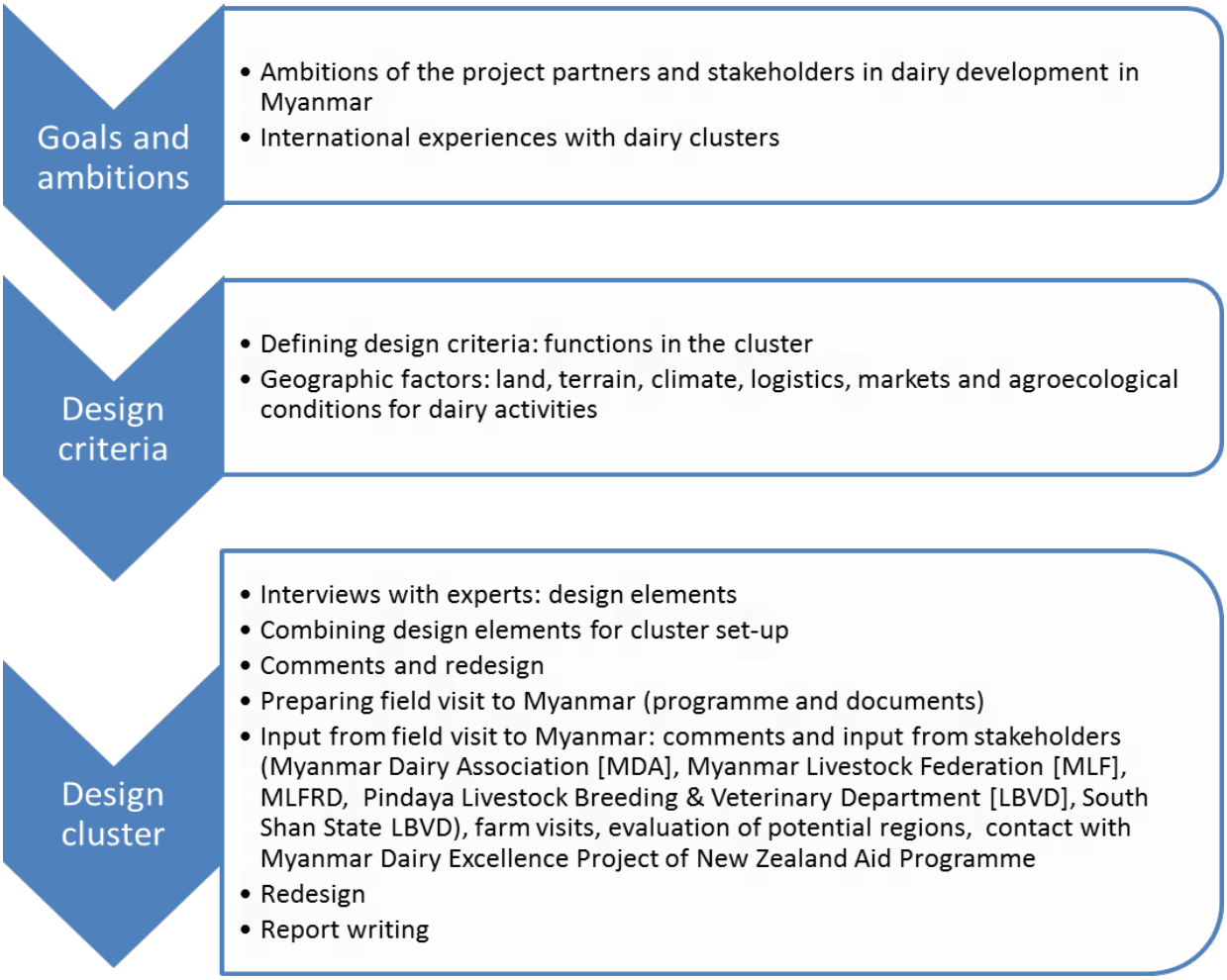

Figure 1. *Activities carried out within the three main stages of the project.*

3.2 Links in supply chain covered

The next chapters focus on a number of links in the dairy chain. The wider approach within this project is to cover the whole agriculture-to-food supply chain[3] as shown in Figure 2. But the emphasis in this project is on the links that deal with cattle feed production, the dairy farm and the dairy processor. We focus on the first links of the chain (Tier 1 in Figure 2) in Chapters 4 and 5. In Chapter 4 we start with dairy farming (production), with fodder and feed as important key inputs that are partly produced on the farm and partly supplied by input suppliers (section 4.3). The next link is collection and processing (Chapter 5). Tier 2 actors and services are partly described in Chapter 6. The finance part of Tier 3 services is described in section 6.2. Environmental issues are mentioned in Chapter 7. The other issues in Tier 3 are beyond the scope of this report, but are also important for a vital dairy cluster.

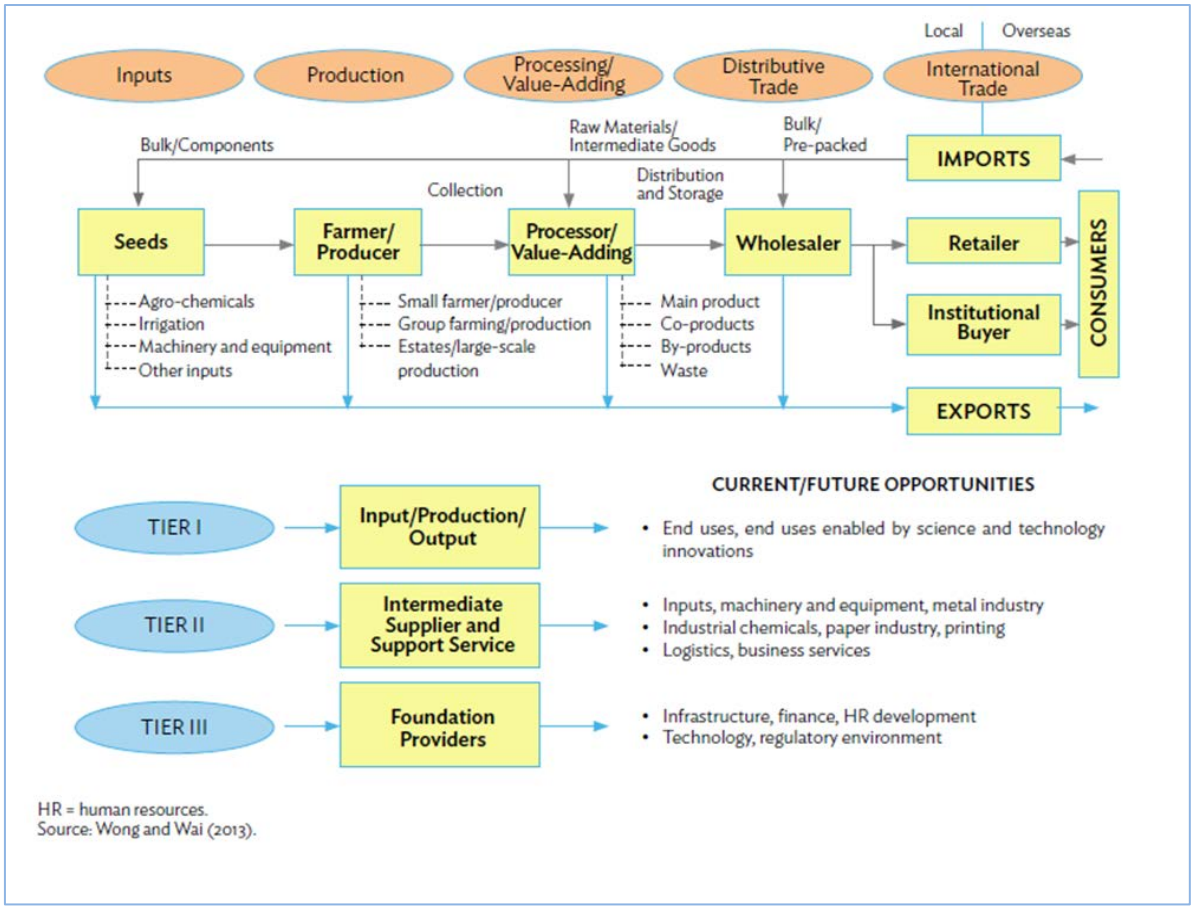

***Figure 2**. Activities along the supply chain (source: Figure 3.9 in Asian Development Bank, 2014, p. 70)*

In future studies a more holistic analysis can give a better insight in the possibilities to integrate dairy farms with other livestock sectors and crops, at farm as well as on cluster level. The same holds true for the complex issue of land availability, land registration and land rights. The focus of this investigation is on designing the cluster concept from the dairy sector and value chain perspective and it is expected that the outcome will enable to oversee all relevant issues that can contribute to successful dairy sector development.

[3] "This approach considers links between inputs, production, processing, storage, and trade to growing demand centers, domestic and abroad, (therefore from "seed to shelf" or "farm to fork"), as well as interactions with intermediate suppliers and support services as important elements for business development. The approach helps identify the support needs of small and medium-sized enterprises (SMEs) operating along the supply chains, such as foundries, mechanization service providers, input suppliers, processors, packers, transporters, and wholesalers." (Asian Development Bank, 2014, p. 70).

4 Dairy farming

4.1 Number of farms and milk volume

The size of the cluster, expressed in number of farms supplying milk or number of cows or acres, determines the scale of the cluster. This also determines the milk volume for the processor. Figure S1 in the Summary shows some of the basic assumptions used about the scale of the cluster. The aim is to start with 50 farms, with an average of 20 cows per farm. With an assumed production per cow of 3,000 kilograms per year in the first years after the establishment of the cluster, this will add up to 50 x 20 x 3,000 = 3,000,000 kilograms of milk per year, or an average daily amount of 3,000,000/365 = ~8,200 kilograms of milk per day to be processed by the dairy plant within the cluster. This volume is what the processor aims to begin with. Within five years after the start, the cluster is predicted to increase its milk volume processed to 16,000 kilograms of milk per day. The collection system needed to collect this volume is reliant on the facilities on the farms that produce the milk. Farms that have more than 40 cows are expected to have bulk coolers on site. Farms with fewer cows will most likely deliver the milk to a collection centre. It is expected that the cluster will need one or two collection centres – perhaps on large farms that have their own bulk coolers – to collect a daily volume of 8,000 kilograms of milk. This volume makes it possible to exploit one insulated bulk truck to haul milk from large farms and/or collection centres to processing plants.

The selection of farms will depend on regional circumstances (see Chapter 9). This will influence the herd size of the farms and the distribution of farms over an area, and therefore the logistics of milk collection. This also influences the criteria the founders of the cluster may use to decide which farms are eligible. In an area with many large farms, they can require a larger herd size to gain entry to the cluster than in an area with only small farms.

4.2 Dairy farming system of farms in the cluster

After the farms have become part of the dairy cluster, they will gradually improve their technical and economic efficiency through improvements in feed, management, breeding and animal health. These improvements are expected to be the result of investments in technology and in skills, knowledge, products and services that are supplied by advisory services, feed suppliers, milk processors and other parties involved in the cluster. The way these services will operate is explained in Chapter 6. In the short term (the first three years), we assume that technical results of the dairy farms will remain close to what they were when the farm joined the cluster. Table 1 shows the desired characteristics and results of the farms that participate in the cluster. In the longer term (after three to ten years), we expect the farms to achieve results as shown in the long-term goals columns in Table 1.

Potential regions are listed and evaluated in Chapter 9. Based on these potential regions, we distinguish between two different types of regions where the cluster could be located: "close-to-market" and "agroecologically suitable" regions (also shown in Table 1). The close-to-market regions refer to areas close to densely populated areas such as Yangon, Mandalay and Nay Pyi Taw. In these regions land is scarce and expensive, and therefore the stocking rates are set higher for the long-term goals. In the agroecologically suitable areas, such as the Shan State and highlands closer to Yangon, more land is expected to be available and milder temperatures favour dairy cattle.

Table 1 shows that we are aiming at long-term goals for herd size of between 30 and 50 cows. Also, the focus even from the start is on farms with herd sizes that have the potential to expand. Expansion will be hard in close-to-market regions because of land scarcity. We expect better long-term prospects for expansion in agroecologically suitable regions.

Increasing herd size and increasing milk production per cow are the main mechanisms to boost domestic production. Both require extra land and better management of cows and fodder production. This requires cooperation with the government to allocate extra land for dairy farms and to support advisory activities aiming at dairy farm management. In this chapter and the next chapters this is elaborated further.

Table 1.

Farming systems in different types of regions and for different planning horizons

Type of region ->		Close-to-market region		Agroecologically suitable region	
Term of goal ->		Short-term goals	Long-term goals	Short-term goals	Long-term goals
Farm size (milking cows)		15	30	25	50
Milk per cow:	kg	3,000	5,000	3,000	5,000
(annual)	viss	1,800	3,100	1,800	3,100
Milk per cow:	kg	10	16	10	16
(daily, per lactation day)	viss	6	10	6	10
Self-sufficiency rate own fodder		>50%	>50%	>50%	>75%
Grass/fodder production Dry matter production grass:					
	kg/ha	15,000	25,000	15,000	25,000
	viss/acre	3,700	6,100	3,700	6,100
Stocking rate: cows/ha		8	14	8	9
	cows/acre	3	6	3	4
Farm size:	ha	2	2	3	6
	acre	5	5	8	14
Milk per farm: kg		45,000	150,000	75,000	250,000
(annual)	viss	28,000	92,000	46,000	153,000
Milk per farm: kg		120	400	200	700
(daily)	viss	80	250	130	420
Concentrate/cow/day: kg		4.0	6.0	4.0	6.0
	viss	2.5	3.7	2.5	3.7

Explanation of figures and calculations:

- *Conversions of weights and surfaces: 1 viss= 1.63 kg, 1 acre = 0.40 ha, 10,000 kg/ha = 2.556 viss/acre*
- *Calculated figures are rounded*

4.3 Supply of fodder and feed

Land in Myanmar is intensively used for cash crops and vegetables. This might limit the possibilities for growing grass (such as signal grass and elephant grass) and fodder crops such as corn, and highlights the need to allocate more land for grass and crops if Myanmar desires to produce more milk. The abundant availability of by-products from the food industry that are high in crude fibre (e.g. pea hulls and brewers grain) offers possibilities to use these products as crude fibre sources for ruminants, but most of these products are low in digestibility; a large proportion of these products in rations will result in low milk production. The limited use of good quality forage and the use of large quantities of concentrate feed to compensate for the low energy content of fodder and by-products is the major reason for the low milk production per cow in South-East Asia. To achieve the long-term goal of 5,000 kg milk per cow per year (Table 1), 75 per cent of the roughage supplied to the cows

should be good quality forage. The other 25 per cent can be filled with rice straw and fibre-rich by-products.

4.3.1 Fodder production

Despite the fact that by-products can partly replace fodder as a fibre source, we consider lack of fodder and the poor quality (in terms of energy value) of fodder as major obstacles to producing more milk in Myanmar. Fodder production will therefore need extra attention. This calls for:

- Availability of knowledge to produce high-yielding grass and fodder crops; the knowledge gap can be closed through training and advice, including field demonstrations of grass and fodder crop varieties so farmers can be educated about the possibilities
- Investigation of possibilities for crop farmers to grow fodder at competitive prices for dairy farmers
- Availability of seed for good quality grasses and fodder crops
- Availability of high quality by-products (as fibre sources) such as spent grains, cottonseed, soybean and other bean hulls
- Feed suppliers and feed advisors who emphasize fodder quality as the basis for milk production.

To deal with the dry season, conservation of grass and fodder and/or irrigated fodder production are possibilities for improving fodder production and allowing cows to produce to their potential. Since conservation techniques are hardly practised in Myanmar, these techniques have to be introduced through advice and training and be supplemented with research on the optimal way to conserve fodder.

Efficient use of manure in fodder production will increase roughage production and will avoid losses of nitrogen and phosphate to air or ground water.

4.3.2 Feed rations and collaboration between farmers and feed suppliers

Feed suppliers will have an important role in improving the quality of fodder, feed and rations. The main contributions expected from the feed companies include:

- Good quality and safe feed: feed that meets in-company quality controls and government regulations; feed that is free of aflatoxin and pesticides
- Advice on:
    - Feed rations for milking cows and young stock
    - Fodder production and conservation: feed supplier takes good roughage quality as priority and supports farmer to grow this roughage
    - Importance of 24/7 access of animals to sufficient drinking water
    - Increasing milk production per cow, good quality milk and how to avoid cow health problems related to feeding.
- Feed in small packages to supply smaller farmers
- Milk replacer to feed to calves.

Feed companies can have a stimulating role in developing efficient milk production systems if they are involved in proof-of-performance trials for different feeds, if companies collaborate with research institutes, and if companies share the results openly with the dairy farmers.

4.4 Organizational structure of the farm

In many parts of Myanmar, farmers are already moving towards more market-oriented farming. Over the years, production of staple crops (primarily rice) has been complemented with production of cash crops for sale in markets or to traders. This has given many farmers experience with producing for the market, resulting in basic commercial insights.

Urbanization and growing demands are, however, causing a larger transition to more commercial food production. This requires farmers to become more market-focused, to invest in technology and to specialize in selected crops. Increased market orientation and specialization asks for adaptation of the farming system. It is likely to result in new ways of linking to the market (how farmers relate to input

suppliers, service providers, traders and processors) and of the ways that farmers work together (more commercial farming puts more responsibility on the individual farmer).

Experiences from other countries in South-East Asia have provided models that may be beneficial to Myanmar farmers, including:

a. Single family farms with permanent land: The farmer owns cattle and land and primarily uses family labour. Family farms are flexible in adapting to peak labour needs. This type of farm offers a sound base for the training and education of young farmers, because they grow up with dairy cattle.
b. Integrated community – ”cowmunity”: A group of farmers collaborate. Most farmers just feed and milk their own cows; some specialize in raising young stock, others in growing fodder. Specialized young stock and fodder farms could result in better use of the genetic potential of cows and crops, which will result in higher live weights of pregnant heifers and higher dry matter yields per hectare. The legal form can be either a producer company, or the individual farmers have their own farm and make mutual contracts about supplies of fodder and pregnant heifers.
c. Dairy village / producer company: Five to ten farmers have a joint enterprise in which they share barn, land and/or equipment. They divide (a number of) tasks on the joint farm.

Combinations of these models are also possible within one region or cluster.

4.5 Farmers: skills and characteristics

It is obvious that farmers who transform to a more market-oriented way of farming will need new skills. Even more important, a change in mindset may be required. While a first priority for smallholder farmers is to avoid risks that could undermine the long-term livelihood security of their farm household, market-oriented farmers need to be focused on capturing opportunities in the market. While they will still look for ways to manage risk, the more entrepreneurial attitude that is required of farmers in dairy clusters is more risk-taking than risk-averse.

There are a number of desirable characteristics that farmers in more market-oriented dairy clusters should have:

Business mindset

- They have a business mindset and are focused on optimizing results. Farming is a commercial business activity, not just a way of living.
- They are independent and entrepreneurial, have an ambitious plan for the future and are able to learn and develop their farm. They are able to carry the responsibility to make their own balanced decisions.
- They are cost-sensitive and use available data to improve farm management; use of modern communication can greatly aid this.

Education and training

- They are well educated and well trained in farm management skills. They have experience with cow management and they know how to take care of cows for optimal dairy results.
- They are ambitious and eager to learn. They have the potential to grow their farm (stepwise) to a specialized dairy farm of a size that can provide for the livelihood of a family (30–40 milk cows). The potential consists of managerial skills and available land or feed resources.
- They are younger than 55 years old, unless a successor is available.

The context conditions required to enable farmers to use their opportunities and skills are described in Chapter 6.

4.6 Key technical characteristics of the farms

A number of important factors affect production efficiency and the milk output of dairy farms in Myanmar generally and should be promoted for farms in dairy clusters. In the ideal situation, these factors are combined with good dairy farming practices. Some of these will be relatively easy to achieve; others may be more challenging and depend on the local conditions.

- **Fodder management**
  - Good land, including the possibility to irrigate so that three maize harvests and/or 11 grass cuttings per year can occur
  - Appropriate field size, to allow for basic mechanization of fodder production
  - Soil type that is clay or loamy, not sandy
  - Potential to conserve feed by making silage (in case of long dry periods)
- **Supply of water to cows**
  - Water is the main ingredient of milk. Clean drinking water should be freely available for lactating cows and young stock
- **Cow health management**
  - Individual cow identification by ear tags
  - Registration of individual cow data: production, health, fertility
  - Preventive actions to avoid diseases, such as vaccination
  - Proper disposal of dead cattle
- **Shelter**
  - Proper shelter is important to protect producing cows against the sun and the heat
  - Barn design that results in natural ventilation
  - Fans in case extra cooling is needed
- **Integrated on-farm manure management**
  - Manure storage
  - Manure is used as fertilizer for growing feed
  - Biogas system may be used to produce energy for farm and household. The effluent is suitable for fertilization
- **Conducive land use regulations**
  - Dairy clusters should be on land where forage production is already allowed (re-zoning of land would take too much time)
  - Liaison with local government about guarantees for expansion options
- **Option of lead farms**
  - Where possible (depending on size): cooling of milk on the farm
  - Use of solar-powered can cooler or chilling tank
  - Large farms (lead farms, demo farms) in the cluster can serve as milk collectors, milk processors, feed distributors and training units

5 Collection and processing

The dairy plant that processes the raw milk will focus on quality products for the urban market. This requires quality raw milk, which means that cooling and restricted transport times are essential.

The processor will have to develop a milk collection system adapted to the number of farms, the volumes of milk to be shipped to the dairy plant (described in section 4.1) and distances between farms and the dairy plant. Travel times between the farm and the closest available cooling facility (either on-farm or at a milk collection centre) should not exceed 45 minutes, since longer unchilled periods lead to deterioration of quality.

At the moment, the Myanmar Government has no legal criteria for raw milk quality. Introducing general criteria enforced by law would stimulate the quality of milk production and would improve the quality of consumer products. It will also make the country more attractive for foreign investors to process domestic Myanmar raw milk.

Characteristics of processor and milk-delivery contracts

- Milk delivery will be on a contract basis with the dairy company. All the milk that meets the agreed quality criteria will be purchased from the farmer (see Table 2 for tentative criteria).

Table 2.

Tentative criteria for milk quality at the start of the dairy cluster

Characteristic	Standard
Total bacterial count	< 500.000
Somatic cell count	< 600.000
Total solids	> 12%
Antibiotics	Prohibited
Later: tests for heavy metals, dioxins, aflatoxins	

- A transparent, quality-based milk payment system, based on fat per cent and/or protein per cent, will be used, with premiums for good quality milk.
- Milk quality data for the farm and related prices are reported to the farmer by email or SMS.
- Milk payments are regular, and are only made into bank accounts (no payments in cash).
- Regular advice about farm hygiene and milk hygiene, linked to milk testing results, is available from the processor.

6 Supporting services

6.1 Advisory services

The feed company and the dairy processor that are involved in the dairy cluster project will take part in advisory services during the first stages of the cluster implementation. Some other suppliers will also be asked – by farmers or other cluster parties – to provide their services. Table 3 presents an overview of the different categories of advice and proposals for the type of advisor that will deal with each category during the first stage after the cluster is established. In this stage farms are still small, and farmers are not used to receiving, accepting or paying for advice.

About five to ten years after the start of the cluster, this free advice can be gradually phased out and replaced by private or farmer-owned advisory firms. Then the advisors should be more independent and focus on issues that farmers are willing to pay for.

In the first stage of the cluster, efforts will be made to collaborate with government and NGOs to supply (partly) subsidized advisory services as well.

Table 3.
Proposal for advisory parties and their role in advisory services.

Category of advice	Type of specialist	Responsible organization (short term)
Feed: ration balancing	Feeding advisor	Feed company
Fodder production	Feeding advisor Crop advisor	Feed company
Milk quality	Milk production advisor	Dairy processor
Health and reproduction	Veterinarian AI technician	LBVD or private veterinarian
Farm management and entrepreneurship coaching Farm performance data evaluation Expansion and investment planning	Economic and strategic advisor Bank advisor	Private consultant Bank
Young stock raising	Feeding advisor	Feed company
Equipment, milking	Sales representative	Dealers for equipment
Equipment, barns	Sales representative	Dealers for equipment

Improving the quality, availability and cost of advisory services will become an important task and shared interest of the parties involved in the cluster approach. This needs attention at the governance level of the cluster, which is further examined in Chapter 8.

Advisors should:

- Know the attitude of farmers in the region and understand that their advice must reflect these attitudes
- Understand that they have to deliver added value to the farmers, to prove that their advice is worth the costs that will have to be paid by the farmers in the near future
- Be respected people with authority based on the results they achieve together with the farmers
- Have practical knowledge of dairy farming in the region, preferably have a farming background and come from the region, and be experienced in advisory work
- Be knowledgeable about animal health, feeding, hygienic milking and milk handling, farm economy and all other aspects of dairy farming, and understand the relationships between these themes
- Visit farms regularly; introducing new methods of farming requires weekly visits

- Facilitate farmer experience exchange, e.g. a study club
- Facilitate training and short courses
- Facilitate applied research activities that will create new knowledge and practices. This research should preferably be carried out on farms in the region. Collaboration with universities or colleges in processing and evaluation of research data can carry research to a higher level.

Farmer-to-farmer advice can be a successful concept if it meets the above requirements. A generally accepted assumption is that successful farmers can easily convince their colleagues to adapt their farms since they can show how it works and can prove that it leads to better results. If they can also combine this with knowledge and experiences from dairy farming abroad, they can be advisors with impact. This is in contrast to specialized external advisors, who often do not speak the language of the farmers, are expensive and cannot spend much time per farm.

6.2 Access to finance

Finance within the cluster refers to financing dairy farmers as well as financing the various businesses around the dairy farm. It also applies to the financing mechanism at the cluster level.

6.2.1 Finance at the cluster level

For financing of investments within the cluster, all investors involved can look for their own financers separately. The alternative is to apply for a facility that finances a wide range of activities within the dairy cluster: processors, suppliers and farmers. When it comes to preparing the implementation of the plan, the participants of the cluster project have to investigate which option offers the most attractive financing mechanism within the Myanmar context.

One of the banks that can support this kind of cluster initiative is the Rural Development Bank, a semi-government bank under the MLFRD, which can provide loans for rural activities. Since there are limited possibilities for Myanmar banks to provide finance, international banks such as FMO (a Dutch development bank), International Finance Corporation, Asian Development Bank or specialized agrobanks such as the Dutch Rabobank might be asked to finance investments within the cluster. In that case, international banks could provide loans and share dairy farming knowledge with commercial Myanmar banks, which deal with the cluster participants asking for loans.

The Myanmar Government also offers special financial support for construction of roads, safe drinking water supply, sanitation and rural electrification.

6.2.2 Finance for farmers

Dairy farms need to finance investments in land, machines, buildings and cattle. These investments are expected to result in extra returns for the remaining life of the assets. Banks are the most obvious institutions to support loans for these types of investments.

The banks that will be involved in financing farming activities should:

- Have staff with proper knowledge on dairy farming (or be willing to train bank staff in basic parameters/benchmarks); this means that they understand the investment needs of dairy farmers, understand the risks in the sector and can judge the skills and repayment potential of farmers
- Provide finance based not only on collateral, but mainly on projected cash flows that will be available for paying interest and repayment of principal
- Provide credit directly to the farmers
- Provide loan periods with a minimum of seven years and a grace period of six to twelve months. Investments in assets like land, machines and cattle have longer repayment periods.

Experiences with tripartite agreements between farmers, banks and milk processors in many countries have shown that they ease financing and repayment. The farmer may allow the processor to pay part

of the milk cheque directly to the bank as repayment. This offers the bank a better guarantee of continued repayment.

Extra finance possibilities can be offered by microfinance providers and the Myanmar Government, which also offers special financial support from revolving funds at the village level from the Community-Driven Development Project (MLFRD, 2014).

Loan guarantees by the government or soft loans with lower interest rates will also be useful instruments to facilitate financing of investments.

The cluster should also develop a farm expansion strategy that can be executed with minimal need for finance. Expansion of cattle numbers using existing stock's own offspring can offer such opportunities. This expansion method can be supported by good health practices, excellent young stock management and use of sexed semen.

6.3 Other inputs and outputs

The services in the next list are needed to create a strong infrastructure for specialized and efficient farms. Some of the services listed here are also listed in Table 3, where categories of advice were mentioned.

Additional suppliers of inputs and traders are:

- Veterinary services: prevention measures, vaccination, treatment and drugs
- AI technicians and semen supplies: semen suppliers supply domestic or foreign semen of bulls with proven progeny data. AI technicians can perform inseminations
- Laboratories to analyse soil, roughage, feed and milk samples. The laboratories of the feed company and the milk processor can be used more efficiently if dairy farmers can also send their feed and milk samples there for quality evaluation.
- Farm equipment sellers:
    - machines for forage production: seeding, mowing, chopping and transport of fodder; manure handling machines
    - milking equipment: milking machines, milk cans, bulk coolers
    - barn equipment: construction companies, stalls, ventilation and water supply
- Fertilizers and crop protection sellers
- Cattle traders and young stock suppliers: young stock suppliers can speed up farm expansion. Cattle traders can help to raise the slaughter value of cull cows
- Water, fuel and electricity suppliers.

7 Sustainability and additional policy goals for dairy production

7.1 Sustainability

The Global Dairy Agenda for Action has developed a dairy sustainability framework (DSF) focusing on eleven key sustainability criteria (Global Criteria), identified as relevant to the dairy sector globally (GDAA, 2014). These criteria are screened for use within the Myanmar context. In this screening, special attention was given to criteria that meet the basic needs of the Myanmar dairy chain in its present stage of development. This selection resulted in the following list of five key sustainability goals for the Myanmar dairy sector:

1. **Product safety and quality:** The integrity and transparency of the dairy supply chain is safeguarded, so as to ensure the optimal nutrition, quality and safety of products.
2. **Rural economies:** The dairy sector contributes to the resilience and economic viability of farmers and rural communities.
3. **Water:** Water availability, as well as water quality, is managed responsibly throughout the dairy value chain.
4. **Manure and soil management:** Manure is managed to minimize impacts on water and air and to apply nitrogen and phosphate in manure efficiently to produce quality grass and fodder crops.
5. **Animal care:** Dairy animals are treated with care and are free from hunger, thirst, discomfort, pain, injury and disease, fear and distress and are able to engage in relatively normal patterns of animal behaviour.

Point 4 is slightly modified compared to the description in the DSF to emphasize that not only should nutrient losses to the environment be avoided, but also that manure nutrients should be used in an efficient way to grow fodder.

In a later stage of development, the sector may add extra sustainability goals from the DSF list. Additional goals refer to greenhouse gas emissions, waste management, biodiversity, market development and working conditions. Another source for good agricultural practices is *Guide to good dairy farming practice* (FAO and IDF, 2011). This guide focuses on animal health, milking hygiene, nutrition, animal welfare, environment and socioeconomic management.

7.2 Special attention for women and smallholders

Position of women

In Myanmar, both women and men are involved in dairy farming. Women often play a role in cow management. This means that special attention must be given to the professional and financial position of women involved in dairy farming. Activities to improve farm management should also be screened for their effect on the position of women in the farm. Women should be involved in training activities both as trainers and as participating farmers.

Position of smallholders

During the phase of selecting participants for the cluster, special attention will be given to smallholders who are eager to participate. When the parties responsible for the implementation of the project have chosen the region where the cluster project would begin, they will pay extra attention to the recruitment of smallholders and to facilities that encourage them to participate and to further develop their farms within the cluster.

8 Governance at the cluster level

Governance at the cluster level should contribute to the competitiveness of the cluster partners and to transparency within the cluster. It should help manage conflicting interests and support collaboration, without compromising the benefits of competition between businesses.

Right from the start, attention to the governance issue requires a multi-stakeholder approach with an independent facilitator, preferably appointed by a cluster board. This facilitator will lead the process to arrive at a shared governance model in which commercial parties can compete, but at the same time joint agreements are made to harvest the social and economic potential of the cluster approach. To date, the following activities have been suggested to be part of that model:

- Consultation between farmers and other parties about large projects: irrigation (with government or water board); milk contracts, including detail about price and quality (with milk processor); electricity and roads (government); telecommunication (providers and government); drinking water supply; and land expansion (government)
- Close cooperation with authorities through all the activities within the cluster. Themes of interest: see first bullet point
- Developing rules for (potential) areas of competition or conflict between cluster parties. Setting rules also means that an appointed body has the power to enforce rules
- Collaboration of different parties to organize advisory services and a research and development program carried out by the advisory service in collaboration with a local university
- Joint supply purchasing by farmers: feed, fertilizer, semen, AI service, etc.
- Advocacy of joint interests and promotion and sharing of experiences of the cluster approach.

To organize and implement the suggested and future activities, a cluster board should be appointed. This board will also be responsible for a coherent governance programme focusing on facilitating the further prosperity of the cluster as a whole.

9 Regions with potential

The discussion in the project team about geographic requirements has raised various options for possible regions for the cluster. Five regions, shown in Figure 3, were selected and rated based on two somewhat conflicting main requirements:

a. distance to customers and to the business centre in the country (Yangon)
b. agroecological suitability to produce in a technical and economically efficient way.

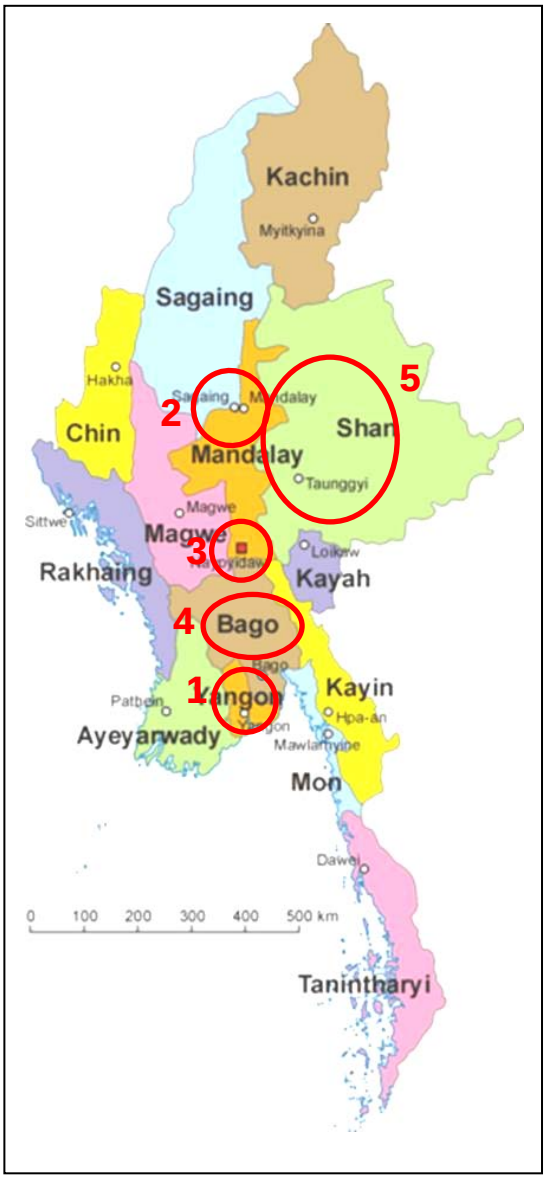

Figure 3. *Location of regions with potential for dairy clusters.*
1= Yangon region,
2= Mandalay region,
3= Nay Pyi Taw region,
4= Bago and Kayin hills,
5= Shan State

The agroecological suitability and distance to markets of these five regions have been evaluated by scoring them on a number of indicators listed in Table 4. The compound score for each of the two categories has been calculated by multiplying the scores with a weight per indicator. These weights are also listed in Table 4, together with the results of the evaluations of these regions. The regions can be grouped in two categories: "Close to major markets" and "High agroecological potential".

A. Close to major markets

During the first stage of investment, foreign feed plants and dairy processors need vicinity to the market, to highways and/or to harbour facilities because of their need to import raw materials: e.g. grains and milk powder. The regional options included in this category are (numbers refer to figure 3):

1. Yangon vicinity (including Hmawbi, Taikkyi, etc.): close to Yangon city and maximum of two hours' drive to Yangon for connection to plants.[4]
2. Mandalay vicinity (current major production area, including townships in regions of Monywa, Patheingyi and Kyaukse): milk can be transported to Yangon with insulated bulk tankers or insulated bulk trucks within four to six hours.
3. Nay Pyi Taw vicinity: milk can be transported to Yangon with bulk trucks within five hours.

B. High agroecological potential

For the successive investment stages and future expansion of production capacity. Examples in this category are (numbers refer to figure 3):

4. Bago Yoma and Northern Kayin Hills (Shwegyin): two hours' drive from Yangon.
5. Shan States – Southern (Kalaw, Taunggyi, Pindaya, Pinlaung) and Northern (Nawnghkio, Kyaukme): four hours' drive from Mandalay, nine hours from Yangon).

The results in Table 4 show the clear differences between close-to-market regions and high-agroecological-potential regions. The first category scores better on distance to markets. The regions Shan State and Mandalay score highest for agroecological suitability. Nay Pyi Taw is intermediate for agroecological suitability as well as for distance to markets.

We did not manage to get information about the forage production regulations of regions. This characteristic is therefore not mentioned in Table 4, although such regulations may have great influence on the availability of land for fodder production.

In this project we did not conclude which region would be the most favourable to begin with the cluster approach. Too much information about the regions was still missing to be able to draw such conclusions, for example, market opportunities, competitiveness of existing processors in a region and number of dairy farmers eligible for joining the cluster, among other things. If the cluster began in a region with many existing dairy farmers, the process of starting it would have the character of a transition towards another chain model as designed within the cluster. Whereas in a region with only few existing dairy farmers, the start-up of a project might focus on raising the interest of smallholders to first join the cluster and encouraging them to later expand.

At the moment, the larger private farms of Myanmar are located near the big cities where their milk is shipped to. We expect this situation to last for the next five to ten years because of better market opportunities and lower transport costs.

[4] The distance between the dairy processing factory and milk collection centres should be less than 1–2 hours' drive in the case of uninsulated transport and 4–6 hours' drive in case of insulated milk trucks that transport cooled milk (at 4^{0} Celsius). A milk collection centre collects milk from 50–75 dairy farms that can reach the collection centre within 45 minutes.

Table 4

Evaluation of potential regions for dairy clusters

	Regions-> / Criteria	Weight*	Close to major markets**			High agro-ecological potential**	
			Yangon vicinity	Mandalay vicinity	Nay Pyi Taw vicinity	Highlands close to Yangon	Shan State
	Agroecological suitability	**Score:**	**95**	**120**	**110**	**95**	**131**
	Climate for dairy cattle:						
1	Moderate temperature/altitude	3	1	2	2	3	4
	Climate for fodder production:						
2	Rainfall / length of rainy season	3	2	1	1	3	4
3	Soil fertility	2	3	3	2	3	4
4	Water availability for irrigation	2	4	3	1	3	3
5	Ground water availability	3	4	2	3	3	3
6	Availability of fodder-growing farmers	2	2	4	3	2	4
7	Potential of future expansion of fodder area	3	1	2	5	3	4
	General:						
8	Availability of existing farms	3	3	5	2	1	2
9	Number of farms with 10–50 cows (present situation)	2	4	4	3	1	1
10	Investments needed to make farms ready to participate in cluster	2	4	3	3	2	3
11	Cost price of milk	3	1	5	4	2	4
12	Availability of land and potential for future expansion of farms	3	1	2	4	3	4
13	Affordable land	2	1	2	4	3	4
14	Human potential: skilled dairy farmers	2	4	5	3	2	3
15	Availability of by-products	3	4	5	3	3	4
	Distance to markets	**Score:**	**52**	**43**	**39**	**37**	**23**
16	Distance to Yangon (km / hrs)	3	5	2	3	4	1
17	Distance to Mandalay (km / hrs)	2	2	5	3	2	3
18	Distance to harbour (km / hrs)	2	5	3	3	4	1
19	Distance between dairy processing factory and dairy farms (km / hrs)	3	5	5	4	3	2
20	Distance between feed factory and dairy farms (km / hrs)	2	4	3	3	2	3

* Weight of the characteristics: 1 = light, 2 = moderate, 3= heavy

** Scores for the regional characteristics: 1= poor, 2 = fair, 3= average, 4= good, 5 = excellent

10 Future steps towards implementation

This report supports and informs the private companies involved in the project to build their strategy of investing in dairy development in Myanmar. The project has been a valuable exploration that has created better insights about the opportunities available. However, many steps still have to be taken before the companies can begin investment activities. The participating partners will have to make more detailed choices about many of the themes mentioned in this paper. We suggest taking these next steps to continue towards implementation of the cluster:

1. Agreement between initiating parties to further develop and elaborate the cluster concept
2. Selection of one or more regions where a cluster could be developed and selection of a region where a pilot will be established: the project team has made a first exploration of five regions, as described in Chapter 9. This exploration has to be continued in more detail and should be followed by the identification of the most suitable region. This requires a more detailed study comprising technical, economic and institutional analysis and also including support from, and more discussions with, regional experts.
3. Process for bringing partners together, who will act as founders of the pilot regional cluster: the partners have to agree on goals, responsibilities, cluster framework and division of tasks. The main partners to consider are dairy processor(s), feed company, banks, other possible financers, advisory services and authorities to supply land for expansion.
4. Feasibility study of the cluster organization to provide specific detail about:
    a. Number and location of the farms that will be participating
    b. Quantities and qualities of, among other things, projections for kilograms of milk, number of cows, acres and kilograms of feed and fodder needed
    c. Participating organizations
    d. Need for finance and financial services of the farms and organizations involved
    e. Exploitation plans for farms, processors and private service suppliers, including cost calculations
    f. Governance of cluster: who will be responsible for the operations of the cluster? How many staff and other resources will be needed? Who covers the costs associated with the governance activities?
    g. Exploitation of advisory services: these might be partly financed by foreign funds or Myanmar Government funds.
5. Preparing implementation: activities to prepare the implementation process, such as agreements, communication and making more detailed plans.
6. Implementation: during this phase the planning will be executed
7. Monitoring and evaluation: operational monitoring and evaluation will support the implementation and adjustment process during day-to-day activities of the cluster. The more strategic evaluation will provide information about taking steps to improve technical and financial results, achieving goals set in the cluster plan and preparing for the expansion phase of the cluster in a later stage.

11 Discussion

In this chapter we describe some issues that investment parties will need to discuss. Many of these issues require extra information, not only about the dairy situation in Myanmar but also from additional explorations of future scenarios for the Myanmar dairy sector.

1. **Involve more stakeholders and start joint exploration, with special attention for Myanmar stakeholders**
   To date, the stakeholder group in Myanmar has been small (MLFRD, MLF, MDA and LBVD) and the meetings with stakeholders were exploring high-level topics, due to the exploratory stage of the project. At a later stage, the group of stakeholders will need to expand and the collaboration will be deepened. The group has a great need for more in-depth knowledge of the Myanmar dairy situation, both at the national level and at regional levels, to strengthen the adaptation of plans to the Myanmar situation. Myanmar partners such as farmer organizations, dairy processors and independent consultants or researchers can add valuable knowledge about their view on the development of the dairy sector and the potential for collaboration with dairy farmers to increase milk production and build a sustainable dairy sector.
2. **Cooperation with Myanmar dairy experts to understand sense of urgency for dairy development**
   In this report the focus is on developing the dairy sector in Myanmar, with emphasis on increased domestic milk production, higher quality milk and more training and advice for farmers to improve fodder management and farmer skills. The Myanmar Government aims to increase milk production and milk consumption, but measures to achieve these goals are still missing. The next steps in developing the sector should also include a more extensive discussion with the government about goals and support, for example, through advisory services and training. Also missing is a closer look at the motivation farmers have to start or expand a dairy farm. Are other agricultural sectors such as poultry, cash crops or vegetable crops more attractive for farmers than dairy? Can we expect more interest in dairying, or is the sector not challenging for farmers and processors? To answer these questions and to get a better insight to the sense of urgency around developing the Myanmar dairy sector will require closer cooperation with the Myanmar Government and Myanmar experts.
3. **Availability of land to supply fodder**
   The availability of enough quality fodder is an important key factor in increasing the domestic milk production in Myanmar. This is a precondition for increasing the milk production per cow, increasing herd size and maintain healthy high producing cows. During the project we have raised many questions about how to secure the future need for more quality fodder. Possible opportunities are: better collaboration with arable famers who are willing to produce fodder, looking for regions with available (marginal) land suited for grass production, and a better use of by-products as fibre source for cows. These and other potential opportunities need further agroecological and socioeconomic investigations to get a better insight to the dairy potential of regions.
4. **Legal framework for milk quality and dairy imports**
   An increase in domestic milk production may be inhibited by illegal imports of milk and dairy products. Accurate figures about these imports are not available, but estimates from a previous study showed that these imports are higher than domestic milk production (Van der Lee et al., 2014). Since no quality controls for these illegal imports are in place they may damage the image of milk, which might lead to a decrease in milk consumption.
5. **Market prices of raw milk**
   Farm gate milk prices on the informal market in Myanmar are considered to be high (between 500 and 1,500 Kyat per viss or €0.25–€0.75 per kilogram; Van der Lee et al., 2014) compared to world market prices, especially considering the generally lower quality of the milk. These high farm gate prices are the result of delivering milk directly to consumers, tea shops and small-scale processors who are producing for local consumers. The high prices seem positive for the short-term development of dairy farming in Myanmar. However, large-scale processors who have to transport milk over long distances, to process the milk and to sell their products to supermarkets,

will consider the present milk price as not very attractive for fulfilling their role in the dairy chain in a profitable way. They prefer professional and efficiently managed farms that specialize in milk production and sell the milk to the processor for a market-based price.

6. **Governance, finance and added value of advisory work**

In this proposal for establishing a dairy cluster, the feed company and the dairy processor will take part in advisory services during the first stages of implementing the cluster. In later stages, the plan is that the farmers will pay for advisory services themselves. In order to reach that goal, farmers have to be convinced of the added value of these services. Governance at the cluster level might help to make the change from financing of advisory services by feed suppliers and processor to financing by farmers. The question also is what added value other organizations can play in advisory work, such as the LBVD and NGOs.

References

Asian Development Bank (2014). Myanmar, unlocking the potential – Country diagnostic study. Asian Development Bank, Economics and Research Department, Mandaluyong City, Philippines.

FAO and IDF (2011). Guide to good dairy farming practice – Animal Production and Health Guidelines, No. 8. Rome.

GDAA (2014). *Global Criteria*. Global Dairy Agenda for Action. Available from http://dairysustainabilityframework.org/dsf-membership/global-criteria/.

Global Times (2013). 'Myanmar drafts 5-year dairy development plan'. 10 May 2013. Available from http://www.globaltimes.cn/content/780681.shtml.

MLFRD (2014). The Ministry of Livestock, Fisheries and Rural Development (English brochure), August 2014. The Republic of the Union of Myanmar.

Morgan, N. and B. Dugdill (2009). Models and opportunities for smallholder dairy producers in Asia: lessons learned, in: Morgan, N. (editor) (2009). Smallholder dairy development: lessons learned in Asia, Bangkok, FAO Regional Office for Asia and the Pacific, RAP Publication 2009/02.

Porter, M.E. (1998). Clusters and the new economics of competition, Harvard Business Review, November–December.

Splinter, G., J. Brusselaers and M. Van Galen (2011). The Dutch and Ethiopean horticultural clusters – A desk study of their characteristics and main challenges, LEI Wageningen UR, The Hague.

Van der Lee, J., M.J. de Jong, Aung Myo Thant, Thiha Oo, Pyi Kyaw Lynn and X.Y. Ren (2014). The Myanmar dairy sector – A quickscan of opportunities. Wageningen, Wageningen UR Livestock Research, Livestock Research Report 824.

To explore the potential of nature to improve the quality of life

Wageningen UR Livestock Research
P.O. Box 338
6700 AH Wageningen
The Netherlands
T +31 (0)317 480 10 77
E info.livestockresearch@wur.nl
www.wageningenUR.nl/livestockresearch

Livestock Research Report 866

Together with our clients, we integrate scientific know-how and practical experience to develop livestock concepts for the 21st century. With our expertise on innovative livestock systems, nutrition, welfare, genetics and environmental impact of livestock farming and our state-of-the art research facilities, such as Dairy Campus and Swine Innovation Centre Sterksel, we support our customers to find solutions for current and future challenges.

The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 6,000 members of staff and 9,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the various disciplines are at the heart of the unique Wageningen Approach.